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(Taiwanese Tuna and Tuna-like Fisheries in the North Pacific Ocean)

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INTRODUCTION

Taiwanese tuna fisheries are mainly comprised of longline and purse seine fisheries, while there are some other small scale fisheries off waters of Taiwan, such as harpoon, set net, gill net in the North Pacific Ocean (North of equator). Among those fisheries, the tuna catch of longline and purse seine fisheries account for more than 90% of the tuna catch of Taiwanese fisheries in the North Pacific Ocean. Taiwanese longline fishery consists of large-scale tuna longline fleet (LTLL, previous named DWLL, ≥ 100 GRT) and small-scale tuna longline fleet (STLL, previous named OSLL, < 100 GRT). The total catch of tunas and billfish (including swordfish, striped marlin, blue marlin, black marlin, and sailfish) for longline fishery in the North Pacific Ocean was 23,771 mt (metric ton) for 2016 with 79 active vessels of LTLL and 1,303 active vessels of STLL. For purse seine fishery, the total catch was 185,692 mt caught by 34 vessels in the Pacific Ocean for 2016. Besides, Taiwan has already collected 1,408 tissue samples of Pacific bluefin tuna in 2016 under the Close-Kin Mark Recapture project.

1. FISHERIES MONITORING

1.1. Tuna Longline fishery

1.1.1 Large-scale tuna longline fleet

Large-scale tuna longline (LTLL) vessels refer to those gross register ton (GRT) are larger than or equal to 100. The LTLL vessels mostly operate in the high seas or in the EEZs of coastal countries under access agreements. Recently, the most significant changes to the numbers of LTLL was resulted from a fleet size reduction program being imposed from 2005 to 2007 for the purpose of sustainable use of fishery resources. Under that program, 32 LTLL vessels previously operated in the Pacific Ocean had been dismantled. The number of active LTLL vessels reached a low level in 2009 for high fuel price with some temporarily ceasing operation, and the vessel number returned to 90 in 2010 and slightly increased to 95 for some shifting from Indian Ocean because of piracy issue in 2011. After that, the number of fishing vessels reduced to 87 in 2012 and 82 in 2013 with some shifting back to the Indian Ocean. Although the number of vessels in 2014 decreased further to 73, it gradually returned to 76 in 2015 and 79 in 2016 (Table 1).

Table 2 shows catch statistics of Taiwanese LTLL vessels operating in North Pacific Ocean during 1997-2016. From 1997 to 2000, albacore was the main catch of Taiwanese LTLL in the North Pacific Ocean, accounting for more than 70% of the total. However, the catch of bigeye tuna, yellowfin tuna and swordfish increased significantly after 2001. The catch of albacore had gradually declined to 1,866 mt in 2009, reaching the lowest level, but increased slightly during recent years with 2,302 mt for 2014 and 2,629 mt for 2015 respectively. The catch in 2016 was preliminarily estimated at 2,395 mt. Prior to 2000, the catch of swordfish in the North Pacific was low and less than 100 mt. Thereafter, the catch increased substantially to more than 1,000 mt from 2001 to 2003 for the increase of fishing efforts on bigeye tuna, but declined to less than 500 mt from 2005 to 2009 due to reduction of fishing efforts. The catch of swordfish increased to more than 500 mt from 2010 to 2011, gradually decreased to 225 mt in 2014, and returned to 724 mt in 2015. The preliminary estimated catch in 2016 was at 692 mt. Table 3 shows sharks catch by species for Taiwanese LTLL operated in the North Pacific Ocean during 2009-2016. The annual shark catches were preliminary estimated at 2,147 mt in 2016. The distribution of fishing efforts of Taiwanese LTLL vessels operating in the Pacific Ocean during 2014-2016 is shown in Figure 1.

The length frequency of albacore and swordfish caught by LTLL in the North Pacific, compiling from logbook data, are shown in Figures 2 and 3. The predominant size range for albacore caught by

LTLL from 2014-2016 located between 80 and 98 cm, 82 and 102 cm, and 76 and 96 cm in fork length, respectively. The dominant size range for swordfish caught by LTLL from 2014-2016 located between 140 and 190 cm, 140 and 190 cm, and 130 and 190 cm in low jaw fork length, respectively. It is noted that the length data of 2015 and 2016 are not recovered completely and therefore still preliminary.

1.1.2 Small-scale tuna longline fleet

The small-scale tuna longline (STLL) vessels generally refer to those vessels smaller than 100 GRT (mostly 50-70 GRT). Table 4 shows the catch of domestic-based and foreign-based STLL vessels operating in the North Pacific by species from 1997 to 2016. STLL vessels are mainly targeting tropical tuna with some bycatch of albacore. The catch estimation of albacore in the North Pacific Ocean ranges between 315 and 930 mt during 2002 to 2015. A preliminary albacore catch was estimated at 1,011 mt in 2016, which is the highest in the recent years. The catch of swordfish fluctuated between 1,200 mt to 4,000 mt from 1997 to 2015. The catch of swordfish in 2016 was preliminary estimated at 1,362 mt. As for Pacific bluefin tuna, in 2007, the catch was 1,401 mt, but gradually decreased to 210 mt in 2012, reaching the lowest in the latest decade. The preliminary estimated catch in 2016 was 454 mt, which decreased slightly from 552 mt in 2015. Table 5 shows sharks catch by species for Taiwanese STLL operating in the North Pacific Ocean during 2009-2016. The annual total catch of shark species was preliminary estimated at 10,199 mt in 2016. The distribution of fishing efforts for STLL vessels from 2014 to 2016 is shown in Figure 4.

The length frequency of albacore, swordfish, and Pacific bluefin tuna caught by STLL vessels in the North Pacific are shown in Figure 2, Figure 3, and Figure 5 separately. For STLL, the size measurements for albacore, swordfish and Pacific bluefin tuna are sampled at domestic fishing ports. The amount of size measurements for albacore from 2014-2016 are 662, 646 and 590. The dominant size ranges for albacore caught by STLL from 2014-2016 are 92-102 cm, 94-102 cm and 90-100 cm (Figure 2). Since the low jaw of swordfish is generally cut onboard, eye-fork length is taken instead. The amount of length measurement for swordfish from 2014-2016 are 1,074, 1,579 and 1,290. The dominant size ranges for swordfish caught by STLL from 2014-2016 are 105-125 cm, 105-115 cm and 100-120 cm, separately (Figure 3). The amount of size measurements for Pacific bluefin tuna from 2014-2016 are 1,633, 2,141 and 1,939. The dominant size frequency of Pacific bluefin tuna caught by STLL in 2014 distributes from 230-250cm. However, the length frequency of Pacific bluefin tuna in 2015 and 2016 reveal two modes at 195-220 cm and 230-255 cm (Figure 5).

1.2. Distant water purse seine fishery

Tuna purse seine fishery was introduced into Taiwan in 1982. At the outset, second-hand Japanese group purse seiners were imported and Japanese fishing masters were employed. Through years of research, the first single boat purse seiner was launched in October 1984, as the cornerstone for rapid development of this fishery in the following 10 years. In 1992, the number of purse seiners reached the highest level of 45 boats. Due to the adjustment of business strategy of some companies, the number of fishing vessels was then reduced to 42. The fleet further reduced to 34 vessels in 2003, after 8 vessels were exported. Since then, it maintained around 34 (Table 1).

Fishing operations of the fleet moved along the equator under a seasonal pattern, mainly concentrating in the exclusive economic zones of Papua New Guinea, Federated States of Micronesia, Kiribati, Nauru, Marshall Islands and Solomon Islands, as well as the neighboring high seas. In the years where El Niño phenomena occur, the fish tends to move eastwards and the fishing activities will follow the pattern of this movement. In contrary, in years of La Niña, fish schools tend

to concentrate more in the western part of the Pacific, and the fishing activities move likewise.

In 2016, the number of active distant water purse seine vessels was 34. The fishing effort distribution in recent three years is shown in Figure 6. In 2016, the fishing activities concentrated in the western and central areas, compared to that of previous year. The total catch of purse seine fishery in 2016 decreased to 185,692 mt from 194,249 mt in 2015 (Table 6). Catch by species for Taiwanese DWPS operating in the North Pacific Ocean is shown as Table 7.

1.3 Other fisheries

Some other small scale fisheries, such as harpoon, set net and gill net have reported some catches of tunas and tuna-like species in Taiwanese coastal and offshore waters. Table 8 shows the catch of 2016 for Taiwanese small scale coastal and offshore fisheries in the North Pacific Ocean.

2. DATA COLLECTION

2.1 Tuna longline fishery

2.1.1 Large-scale tuna longline fleet

There are two types of fisheries data routinely collected for LTLL: the commercial data (for estimation of total catches), and the logbook data (for compilation of catch and effort data). Several sources of commercial information are available including traders, Taiwan Tuna Association, certified weight reports provided by the Organization for the Promotion of Responsible Tuna Fisheries (OPRT) and so on. After cross-checking and compilation, the commercial information is used to estimate total catches of the Category I data.

The logbook data includes each set of catch in number and weight by species, effort deployment, fishing location as well as the length measurement of the first 30 fishes caught each set. Categories II and III data are all compiled from this data set.

Besides paper logbook, Taiwan has also introduced electronic logbook system in the Pacific Ocean since 2014. Under this system, fishing vessels are required to report their fishery data daily to the data center of Fisheries Agency through satellite transmission. The system improves the recovery of fishery data in a real-time manner.

2.1.2 Small-scale tuna longline fleet

Two categories of STLL are defined: one is that station and unload their catches at domestic fishing ports (domestic-based STLL), and the other is that station and unload catches at foreign ports (foreign-based STLL). For domestic-based STLL, the landing records from local fishing markets is the main source of ISC Category I data. For foreign-based STLL, Category I data are mainly estimated from landing reports collected from foreign-based agents and monthly catch report from individual vessel.

Since 1997, logbook data of STLL have been collected, and port sampling at domestic fish markets has also been strengthened by collecting size data of major tuna species (mainly bigeye tuna and yellowfin tuna). However, at the beginning, the recovery rate of logbook was about 2%-5% which was too low to be compiled for Category II data, and insufficient for stock assessment. To improve the recovery rate of logbook, Fisheries Agency have launched a data improving program by dispatching its staffs to collect logbook, interview with fishermen so as to obtain fisheries

information, and conduct size sampling program at main domestic fishing ports of Tungkang, Nanfangao and Singang since April 2007. Through this program, the recovery rate of logbook has improved to 31% in 2016.

Since 2015, Fisheries Agency has started implementing the electronic logbook system on small-scale longline vessels. These fishing vessels have to report their catches through the satellite transmission daily, and the fishery data recovery rate improved significantly.

For the purpose of conservation and management of Pacific bluefin tuna resource and well collection of catch data, Fisheries Agency has imposed the Catch Documentation Scheme (CDS) since March 2010. According to the regulation, all vessels fishing for Pacific bluefin tuna shall be authorized by Fisheries Agency every year and satellite based vessel monitoring system (VMS) is required to be installed on board. Once Pacific bluefin tuna was caught, fisherman shall attach a tag issued by Fisheries Agency to each Pacific bluefin tuna, record the number and individual weight of Pacific bluefin tuna.

To develop the Pacific Bluefin Close-Kin Mark Recapture project, ISC members decided to collect tissue samples for genetics analysis. In 2016, Taiwan has already collected 1,403 tissue samples of Pacific bluefin tuna. These Pacific bluefin tuna were caught by STLL and sampled from domestic fishing ports of Tungkang and Nanfangao. The length distribution of sampled fish was from 187 cm to 282 cm in fork length.

2.2 Distant water purse seine fishery

The logbook recovery rate for distant water purse seine fishery has always been satisfactory, reaching 100%. Length data has been collected from fishing vessels since 2013.

2.3 Other fisheries

The annual catch data of small scale coastal and offshore fisheries are collected by local governments.

2.4 Observer program

To better understand the fishing activities of the longline fishery, including target and non-target species and to be in line with the international requirements for conserving marine resources, Fisheries Agency has launched a pilot observer program since 2001 in the Indian Ocean. Table 9 shows the number of observers in each year during 2002-2016. The observer program has been carried out in Pacific Ocean since 2002. In accordance with the government's policy of establishing an observers program and availability of budgets to support the increase of observers, the number of observers gradually increased annually, besides, it has been extended to the STLL fleets since 2012. The number of observers deployed on longline vessels in 2016 was 23 in total, including 10 observers for LTLL vessels and 13 observers for STLL vessels respectively.

2.5 VMS monitoring

Vessel monitoring system (VMS) were installed on some longliners (over 100 tons) prior to 2005. Since 2005, Taiwanese tuna fishing vessels with GRT over 20 tons fishing for highly migratory fish stocks in the area beyond national jurisdiction are all required to install VMS. In addition to

monitoring the fishing activities, those data are also used to verify the operating location information recorded in logbook.

3. RESEARCH

For the purpose of improving stock assessment of species in the North Pacific, government of Taiwan has commissioned scientists to conduct a series of researches in 2016 as follows :

1. Studies on abundance index and stock assessment of tropical tuna in the Western and Central Pacific and bluefin tuna in the Pacific Ocean.
2. A study on CPUE standardization and stock status for billfishes in three oceans.
3. Study on age composition of southern bluefin tuna and Pacific bluefin tuna in the longline fishery.
4. Study on the Pacific albacore stock status.
5. Studies of shark by-catch, abundance index and non-detriment findings in three Oceans.
6. Research on Incidental Catch of Ecological Related Species by Taiwanese Distant Water Tuna Longline Fisheries
7. Study of reducing seabird bycatch of small-scale longline vessels in the Western and Central Pacific.
8. Feasibility analysis on the fishing condition forecast of albacore tunas for the Taiwanese tuna longline fishery in three oceans.
9. Feasibility analysis on the fishing condition forecast of yellowfin and bigeye tunas for the Taiwanese tuna longline fishery in three oceans.
10. Feasibility analysis on the fishing condition forecast of swordfish for the Taiwanese tuna longline fishery in three oceans.
11. The feasibility analysis on purse seine fishing condition of skipjack tuna in the western and central Pacific Ocean.

And the scientific papers presented at recent ISC meetings during 2016 to 2017 were as follows:

1. Catch, size and distribution pattern of blue sharks by Taiwanese small-scale longline fleets in the North Pacific in 2001-2015. (ISC/16/SHARKWG-1/20)
2. Size and spatial distribution of the blue shark, *Prionace glauca*, caught by Taiwanese large-scale longline fishery in the North Pacific Ocean. (ISC/16/SHARKWG-1/21)
3. Catch estimate and CPUE standardization of the blue shark based on observers' records of Taiwanese large-scale tuna longline fisheries in the North Pacific Ocean. (ISC/16/SHARKWG-1/22)
4. Estimation of sexual maturity-at-length of the North Pacific albacore. (ISC/16/ALBWG-02/10)
5. The development of Taiwanese longline fishery in the North Pacific Ocean and estimation of albacore CPUE exploited by albacore-targeting fishery, 1995-2015. (ISC/16/ALBWG-02/09)
6. Catch estimates and size compositions of blue marlin (*Makaira nigricans*) from the Taiwanese fisheries in the Pacific Ocean. (ISC/16/BILLWG-2/02)
7. Update of Standardized PBF CPUE Series for Taiwanese Longline Fishery. (ISC/16/PBFWG-1/02)
8. CPUE Standardization of Blue Marlin (*Makaira nigricans*) for the Taiwanese Distant-Water Tuna Longline Fishery in the Pacific Ocean. (ISC/16/BILLWG-1/10)
9. Standardized PBF CPUE Series for Taiwanese Longline Fishery. (ISC/17/PBFWG-1/02)
10. Length distributions of albacore catch made by Taiwanese albacore-targeting longline fishery in the Pacific Ocean north of 25°N, 2003-2015. (ISC/17/ALBWG/02)

Table 1. Number of Taiwanese tuna fishing vessels operating in the Pacific Ocean by fishery

Year \ Fishery	Longline Fishery		Purse Seine Fishery
	LTLL	STLL	
2007	90	1,750	34
2008	84	1,260	34
2009	75	1,220	34
2010	90	1,236	34
2011	95	1,376	34
2012	87	1,326	34
2013	82	1,296	34
2014	73	1,275	34
2015	76	1,306	34
*2016	79	1,303	34

LTLL: large scale tuna longline vessel, STLL: small scale tuna longline vessel

* Data of 2016 is still preliminary.

Table 2. Catch by species of Taiwanese LTLL operating in the North Pacific Ocean

Unit: MT

Year	ALB	PBF	BET	YFT	SWO	MLS	BUM	BLM	SFA	SKJ	TOTAL
1997	9,119	0	112	41	15	59	20	1	13	72	9,452
1998	8,617	0	156	39	20	90	21	5	34	444	9,426
1999	8,186	0	360	122	70	66	53	8	5	114	8,984
2000	7,898	0	1,450	584	325	153	75	19	49	195	10,748
2001	7,852	0	4,569	1,882	1,039	121	209	4	4	243	15,923
2002	7,055	0	7,257	2,689	1,633	251	138	5	1	16	19,045
2003	6,454	0	2,936	1,105	1,084	241	218	4	7	40	12,089
2004	4,061	0	4,939	1,230	884	261	372	2	11	191	11,951
2005	3,990	0	3,963	1,552	392	199	376	15	63	175	10,725
2006	3,848	1	2,756	1,035	438	204	363	5	11	8	8,669
2007	2,465	0	2,965	657	345	102	275	1	2	3	6,815
2008	2,490	+	2,840	484	338	78	255	1	20	129	6,635
2009	1,866	0	2,302	303	373	37	225	0	8	175	5,289
2010	2,281	0	3,139	467	531	53	409	32	4	44	6,960
2011	2,972	0	3,318	448	502	74	675	16	40	85	8,130
2012	2,055	0	2,653	285	350	91	287	5	29	82	5,837
2013	3,836	0	1,814	281	291	87	253	+	23	102	6,687
2014	2,302	0	1,349	221	225	25	146	1	0	47	4,316
2015	2,629	0	2,745	730	724	47	468	1	40	90	7,474
*2016	2,395	0	2,681	1,043	692	79	600	1	20	74	7,585

Species -- Albacore (ALB), Pacific bluefin tuna (PBF), bigeye tuna (BET), yellowfin tuna (YFT), swordfish (SWO), striped marlin (MLS), blue marlin (BUM), black marlin (BLM), sailfish (SFA), skipjack tuna (SKJ)

* Data of 2016 is still preliminary.

Table 3. Shark catch by species for Taiwanese LTLL operating in the North Pacific Ocean

Unit: MT

Year	BSH	FAL	SMA	OCS	THR	SPN	POR	SKX	TOTAL
2009	417	155	78	32	10	-	0	29	721
2010	238	109	54	21	9	3	0	11	445
2011	670	289	208	53	43	9	0	29	1,301
2012	401	197	74	11	6	+	0	3	692
2013	453	173	107	0	3	+	0	13	749
2014	481	68	119	0	2	0	0	5	675
2015	943	13	322	0	50	6	0	49	1,383
*2016	1,664	17	327	0	87	8	0	44	2,147

Species -- blue shark (BSH), silky shark (FAL), shortfin mako sharks (SMA), oceanic whitetip (OCS), thresher sharks (THR), hammerhead sharks (SPN), porbeagle shark (POR), other sharks & rays (SKX).

* Data of 2016 is still preliminary

Table 4. Catch by species for Taiwanese STLL operating in the North Pacific Ocean

Unit: MT

Year	ALB	PBF	BET	YFT	SKJ	SWO	MLS	BUM	BLM	SFA
1997	337	1,814	3,506	9,419	59	1,358	290	3,625	611	527
1998	193	1,910	3,520	8,955	32	1,178	205	3,603	469	868
1999	207	3,089	2,578	8,961	27	1,385	128	3,362	563	402
2000	944	2,780	2,041	7,848	31	3,390	161	4,056	453	499
2001	832	1,839	1,898	8,166	26	3,813	129	4,524	428	640
2002	910	1,523	2,150	9,145	67	3,766	226	4,310	173	504
2003	712	1,863	6,136	15,689	14	3,687	681	7,467	1,110	2,079
2004	927	1,714	4,067	12,617	32	3,364	261	6,300	1,506	2,081
2005	482	1,368	5,314	12,181	33	3,572	584	7,254	1,144	1,333
2006	469	1,148	6,204	13,116	24	3,944	537	5,366	961	488
2007	451	1,401	5,075	11,885	17	3,754	199	4,842	259	1,059
2008	579	979	6,055	12,567	15	3,407	192	5,222	249	918
2009	512	877	3,807	13,122	66	3,177	225	4,413	298	372
2010	537	373	1,967	13,692	169	2,313	200	4,550	383	960
2011	462	292	2,769	11,382	235	3,075	269	3,950	335	876
2012	588	210	4,240	11,237	190	3,396	352	3,803	240	740
2013	591	331	3,493	9,928	265	2,555	285	4,354	444	665
2014	315	483	2,687	6,964	122	2,592	115	4,715	441	443
2015	391	552	2,504	6,679	70	2,475	181	3,838	386	472
*2016	1,011	454	2,650	6,920	126	1,362	135	2,798	177	553

Species -- Pacific bluefin tuna (PBF), albacore (ALB), bigeye tuna (BET), yellowfin tuna (YFT), skipjack tuna (SKJ), swordfish (SWO), striped marlin (MLS), blue marlin (BUM), black marlin (BLM), sailfish (SFA).

* Data of 2016 is still preliminary

Table 5. Shark catch by species for Taiwanese STLL operating in the North Pacific Ocean

Unit: MT

Year	BSH	FAL	MAK	OCS	THR	SPN	POR	SKX	TOTAL
2009	11,124	390	477	15	628	552	0	3,217	16,403
2010	7,432	146	620	7	498	320	0	1,925	10,948
2011	12,447	216	976	2	788	388	0	3,087	17,904
2012	10,205	94	686	2	579	349	0	3,051	14,966
2013	5,868	55	518	0	717	316	0	2,644	10,118
2014	7,670	35	391	0	531	218	0	1,403	10,248
2015	7,608	19	571	0	459	245	0	1,298	10,200
*2016	7,780	26	470	0	430	172	0	1,321	10,199

Species -- blue shark (BSH), silky shark (FAL), mako sharks (MAK), oceanic whitetip (OCS), thresher sharks (THR), hammerhead sharks (SPN), porbeagle shark (POR), other sharks & rays (SKX).

The catches of shark species in frozen form still needs to be converted to process the round weight.

* Data of 2016 is still preliminary

Table 6. Catch by species for Taiwanese DWPS operating in the Pacific Ocean

Unit: MT

Year	SKJ	YFT	BET	Total
2005	165,289	27,572	2,178	195,039
2006	189,392	19,793	978	210,163
2007	209,002	21,147	2,386	232,535
2008	165,007	35,770	3,196	203,973
2009	173,725	16,237	2,113	192,075
2010	166,211	29,203	3,437	198,851
2011	155,641	18,143	2,151	175,935
2012	172,664	25,750	2,239	200,653
2013	186,330	22,659	3,491	212,480
2014	213,154	20,548	3,418	237,120
2015	160,597	28,593	5,059	194,249
*2016	146,204	34,494	4,994	185,692

DWPS: distant water purse seiner

Species -- skipjack tuna (SKJ), yellowfin tuna (YFT), and bigeye tuna (BET).

* Data of 2016 is still preliminary

Table 7. Catch by species for Taiwanese DWPS operating in the North Pacific Ocean

Unit: MT

Year	ALB	PBF	BET	YFT	SWO	MLS	BUM	BLM	SFA	SKJ	TOTAL
2005	-	-	1,167	11,166	-	-	-	-	-	69,500	81,833
2006	-	-	182	7,717	-	-	-	-	-	75,442	83,341
2007	-	-	564	8,037	-	-	-	-	-	87,232	95,833
2008	-	-	1,243	9,994	-	-	-	-	-	50,587	61,824
2009	-	-	568	6,319	-	-	-	-	-	69,026	75,913
2010	-	-	121	1,215	-	-	-	-	-	42,397	43,733
2011	-	-	724	4,037	+	-	2	3	+	42,796	47,562
2012	-	-	764	7,517	-	+	12	2	+	71,482	79,777
2013	-	-	1,749	8,714	-	+	9	3	+	66,694	77,170
2014	-	-	1,248	8,700	+	1	7	4	+	95,091	105,051
2015	-	-	2,082	17,873	-	-	3	2	+	59,274	79,234
*2016	-	-	2,196	12,586	-	1	4	2	+	57,384	72,443

DWPS: distant water purse seiner

Species -- Albacore (ALB), Pacific bluefin tuna (PBF), bigeye tuna (BET), yellowfin tuna (YFT), swordfish (SWO), striped marlin (MLS), blue marlin (BUM), black marlin (BLM), sailfish (SFA), skipjack tuna (SKJ).

* Data of 2016 is still preliminary

Table 8. The annual catch of Taiwanese coastal and offshore fisheries in the North Pacific Ocean for 2016

Unit: MT

Fisheries	PBF	ALB	BET	YFT	SKJ	SWO	MLS	BUM	BLM	SFA	SSP	SKX	TOTAL
Offshore Gillnet	0	2	0	3	7	+	0	0	4	0	-	83	99
Offshore Others	0	4	8	100	2,616	0	+	+	5	22	-	166	2,922
Coastal Gillnet	1	+	+	8	93	4	4	14	37	132	-	137	430
Coastal Setnet	25	1	11	30	1,580	4	1	3	5	66	-	7	1,733
Coastal Harpoon	0	0	0	0	0	0	28	177	149	277	-	0	631
Costal Longline	0	0	0	2	1	0	0	0	0	+	-	5	8
Coastal Others	0	0	0	12	102	0	0	0	0	0	-	7	121

Species -- Pacific bluefin tuna (PBF), albacore (ALB), bigeye tuna (BET), yellowfin tuna (YFT), skipjack tuna (SKJ), swordfish (SWO), striped marlin (MLS), blue marlin (BUM), black marlin (BLM), sailfish (SFA), shortbill spearfish (SSP), other sharks & rays (SKX).

Data of 2016 is still preliminary.

Table 9. The number of observers deployed on longline vessels in Pacific Ocean during 2002-2016

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	*2016
Number of observers	1	3	4	5	10	15	14	22	17	15	32	24	24	32	23

* Data of 2016 is still preliminary

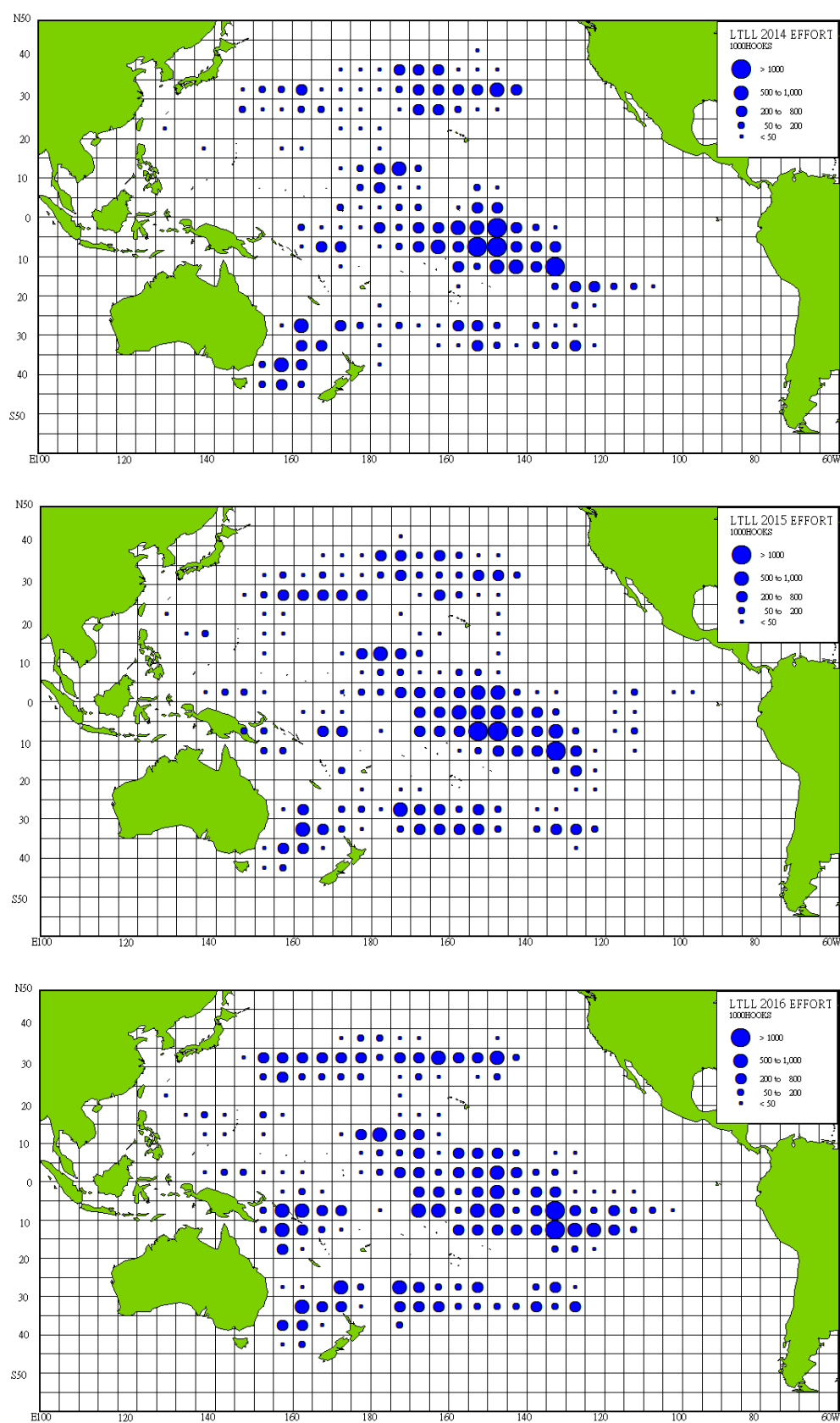


Figure 1. Distribution of fishing effort for Taiwanese LTLL vessels operating in the Pacific Ocean during 2014-2016 (Note: Map of 2015 and 2016 is still preliminary and will be revised shortly.)

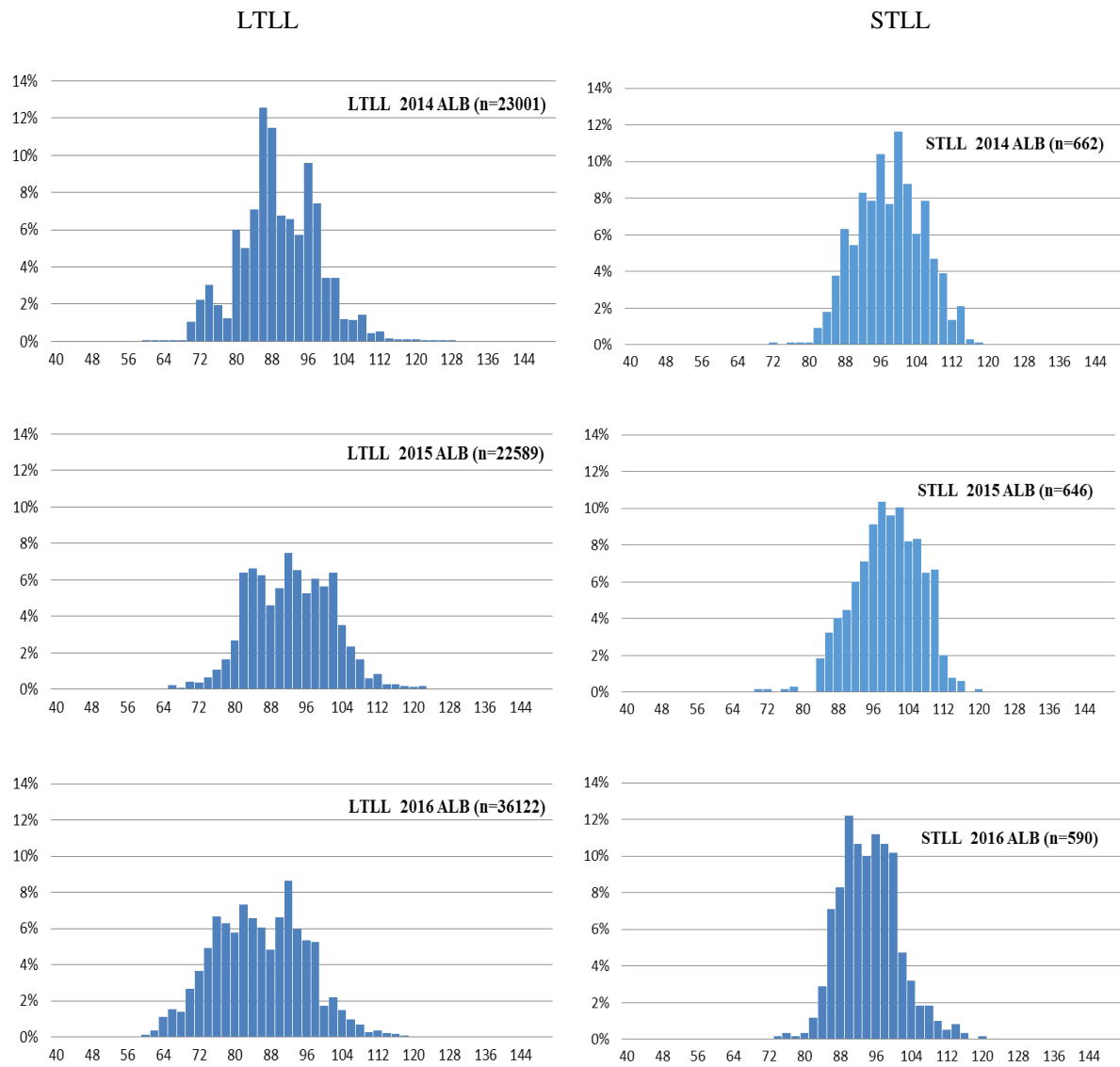


Figure 2. Length frequency distribution of albacore caught by Taiwanese LTLL and STLL vessels in the North Pacific Ocean during 2014-2016.

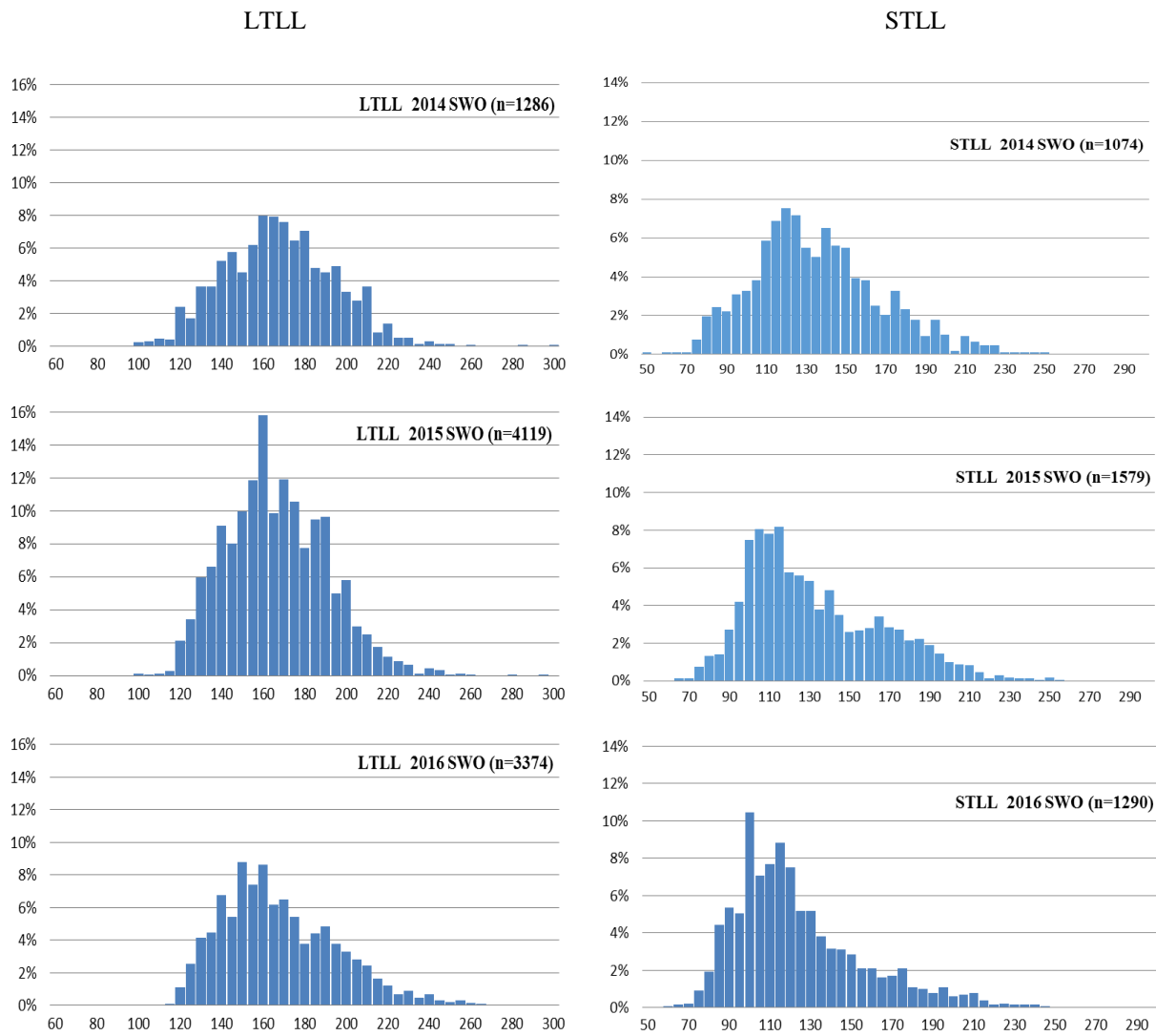


Figure 3. Length frequency distribution of swordfish caught by Taiwanese LTLL and STLL vessels in the North Pacific Ocean during 2014-2016 (measurement: low jaw-fork length for LTLL, eye-fork length for STLL).

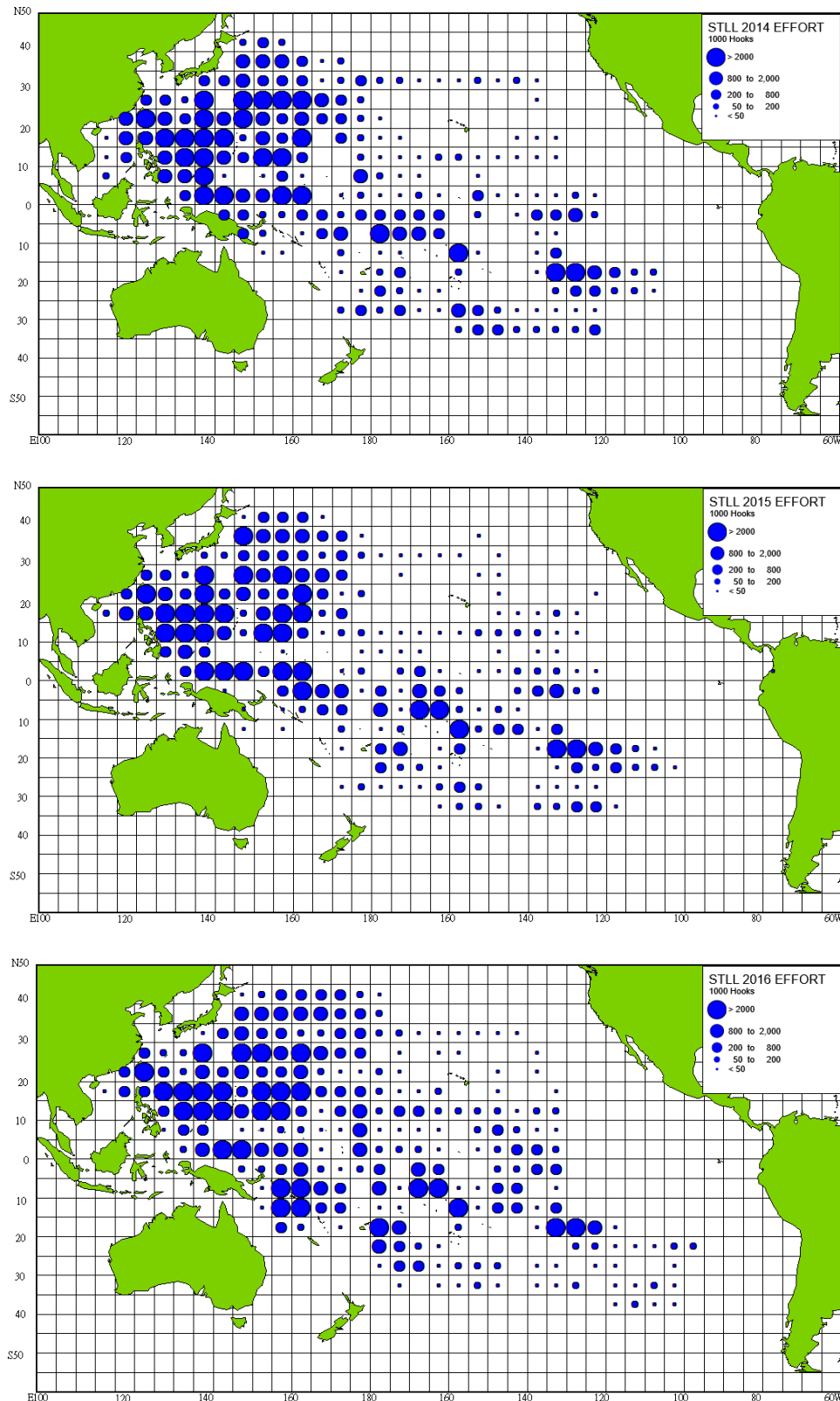


Figure 4. Distribution of fishing effort for Taiwanese STLL vessels operating in the Pacific Ocean during 2014-2016. (Note: Map of 2015 and 2016 is still preliminary and will be revised shortly.)

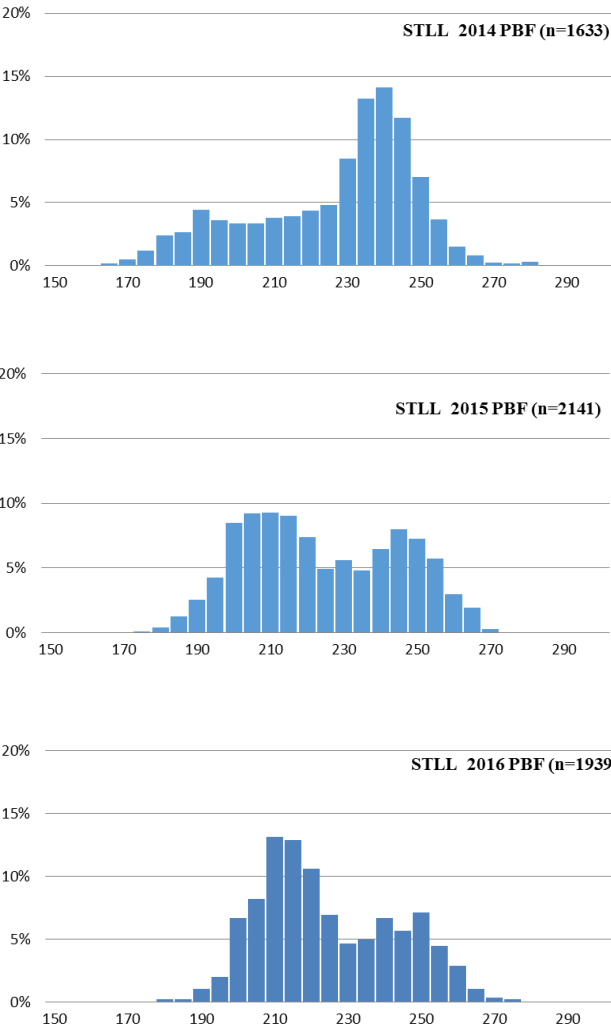


Figure 5. Length frequency distribution of Pacific bluefin tuna caught by Taiwanese STLL vessels in the North Pacific Ocean during 2014-2016.

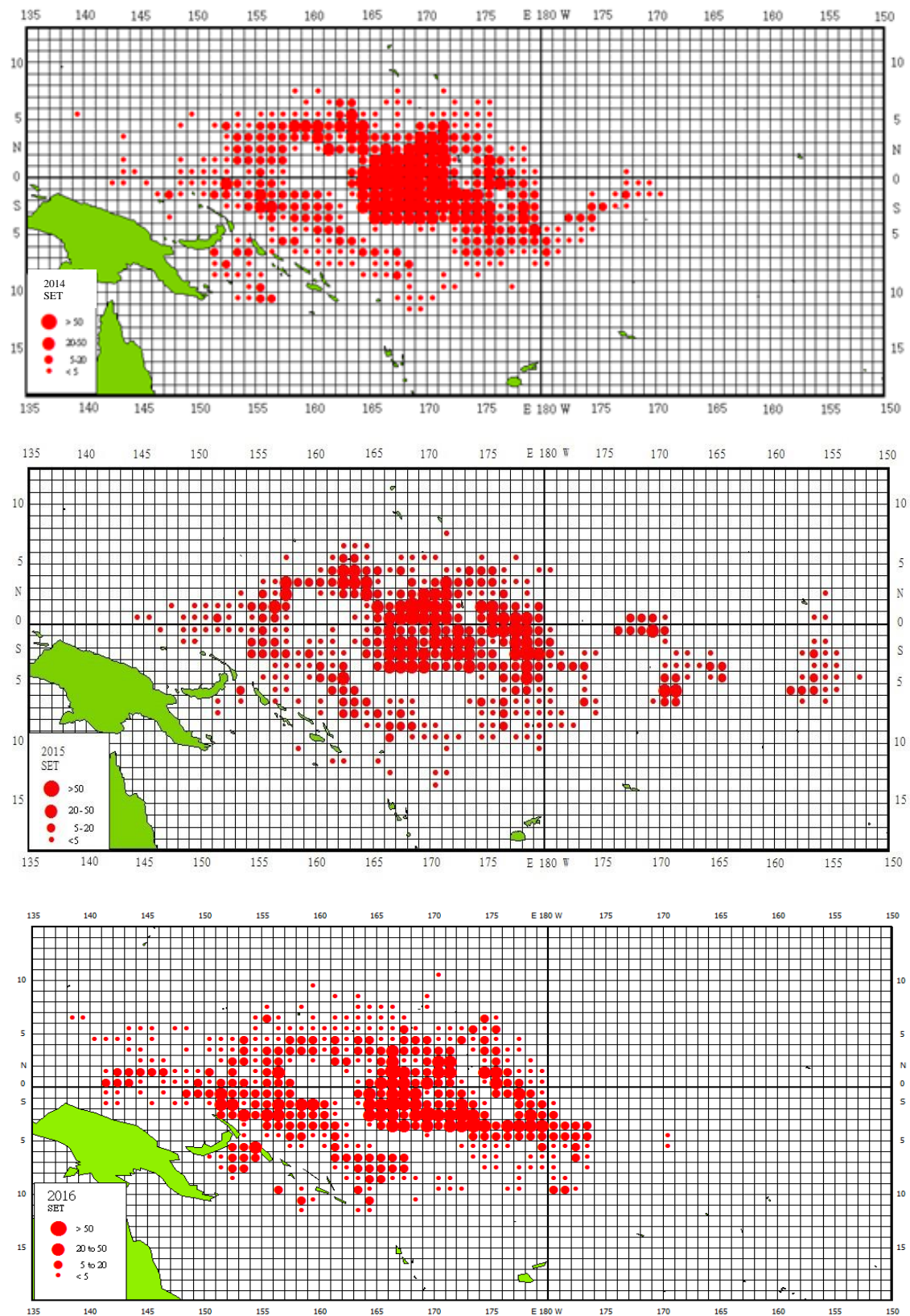


Figure 6. Distribution of fishing effort for Taiwanese distant water purse seine vessels operating in Pacific Ocean during 2014-2016.